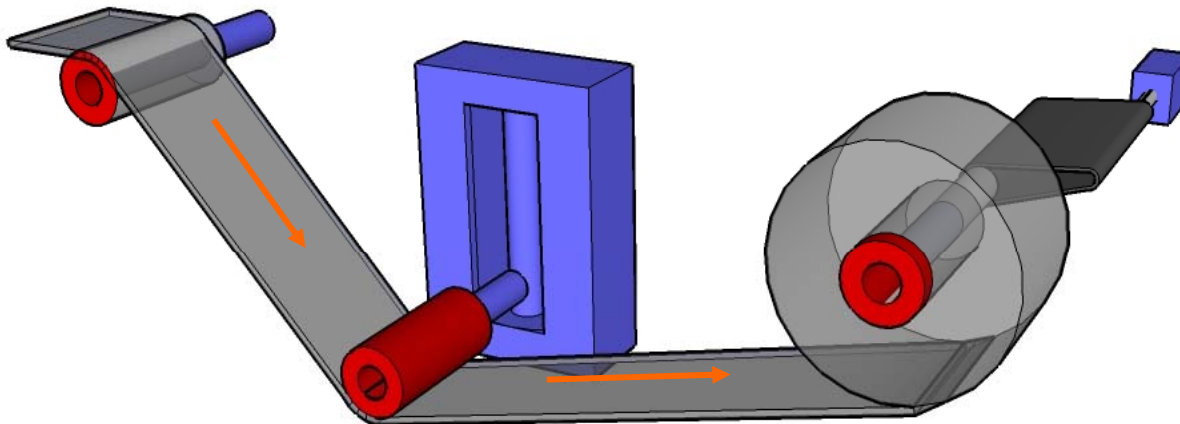


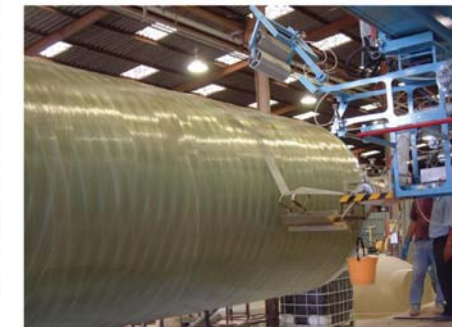
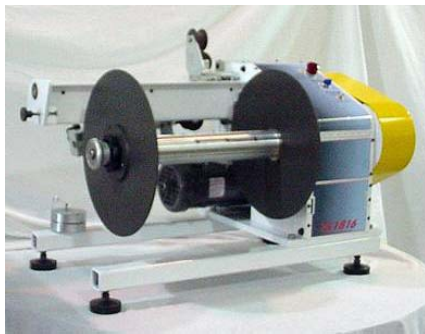
Winding Applications

An overview to winder applications along with Mitsubishi Electric solutions



Applications

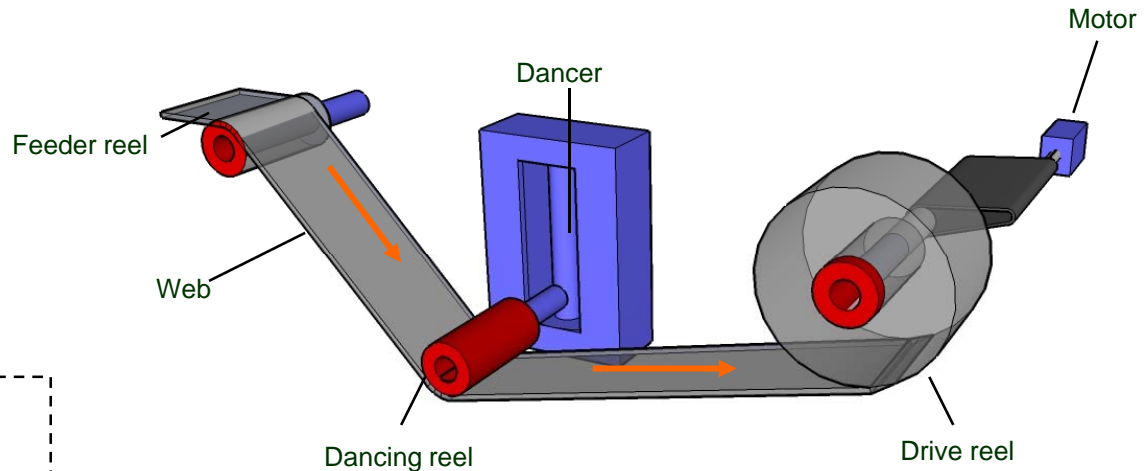
- Paper winding
- Label Winding
- Wire Drawing
- Printing industry
- Plastic sheet winding



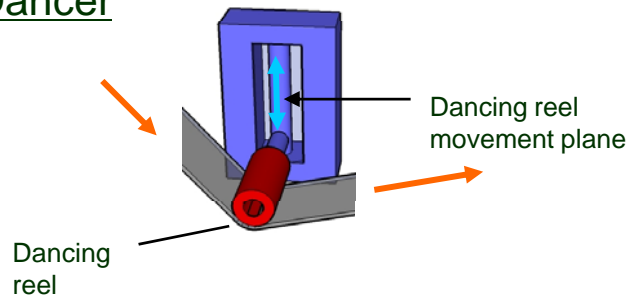
Winding Applications

1 . Mechanics

The purpose of a winding applications is to take-up or release a web to/from a reel. Key points of the application are tension control and speed/torque control of the motor

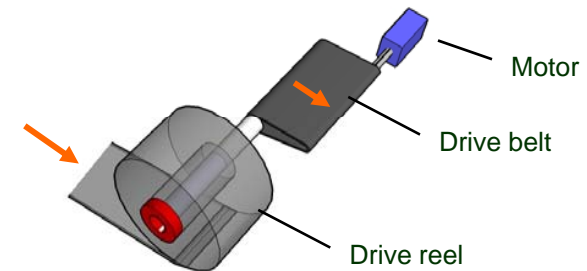


Dancer



The dancer's primary function is to monitor the tension of the web within the application. This is achieved with the use of a non-contact potentiometer that is located on the dancer.

Motor control



The motor is responsible for providing the necessary drive torque to wind the web. Successful motor control is based mainly on the inverters ability to process signals received from within the application, specifically the dancer's potentiometer.

Winding Applications

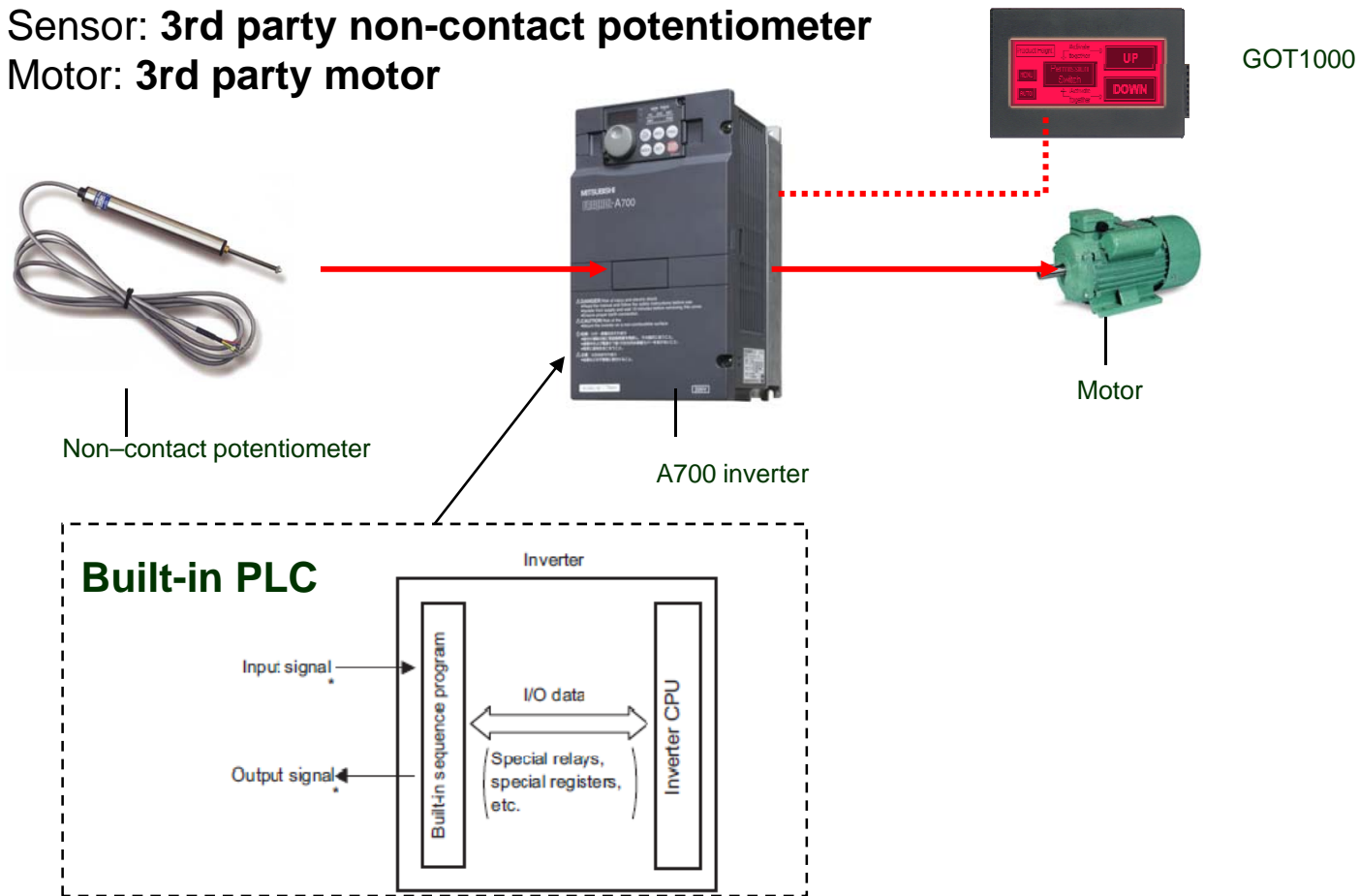
2. Mitsubishi Solution

Inverter: **FR-A700**

HMI: **GOT1000 (Optional)**

Sensor: **3rd party non-contact potentiometer**

Motor: **3rd party motor**



Winding Applications

3. Real sensorless vector control

The primary solution for simple winding applications is real sensorless vector control, where the motor without an encoder.

Benefits:

- Reduced the speed fluctuation even at a severe load fluctuation
- Generation of low speed torque
- Prevention of machine from damage due to too large torque (torque limit)
- Performs accurate torque control

System Settings

A700 parameter setup

Speed control – Gain adjustment, stabilize speed, accel/decel control

Torque control – Improve torque control accuracy

Motor settings – Protect the motor

Analog input – tension control signal input from potentiometer

Communication – PC + GOT comm. settings

PLC Program setup

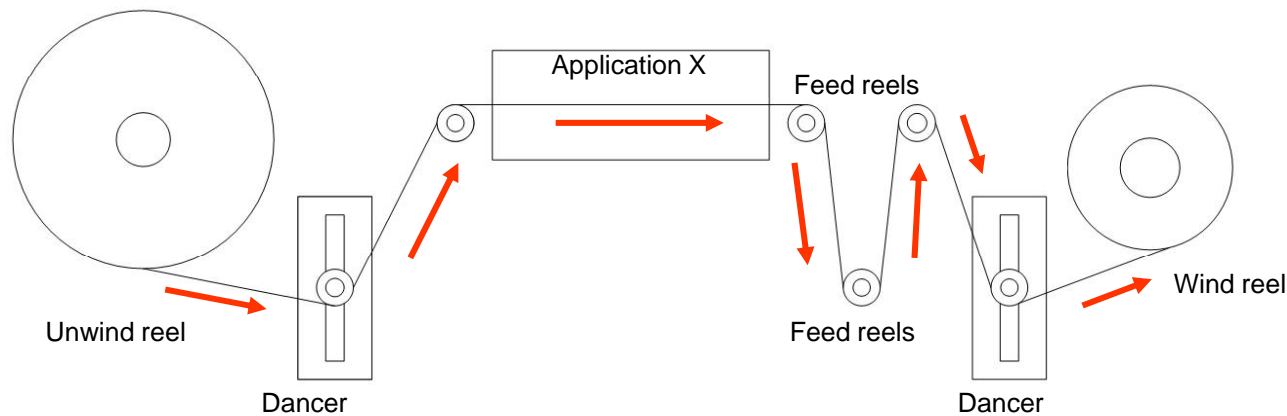
Motor torque control – adjust the speed of the motor depending on material tension

Gain control – adjust the gain of the motor depending on the state of the system

Winding Applications

4. Unwinding Applications

In unwind applications, typically the unwind motor is set in torque mode where the motor is initially driven at low speed in reverse. This takes up any slack that may exist within the web prior to processing. Once the tension is acceptable for processing the wind motor will engage allowing winding of the web. As soon as the winder engages the unwinder will then provide the necessary torque to allow the web to slip from the unwind reel.



Winding Applications

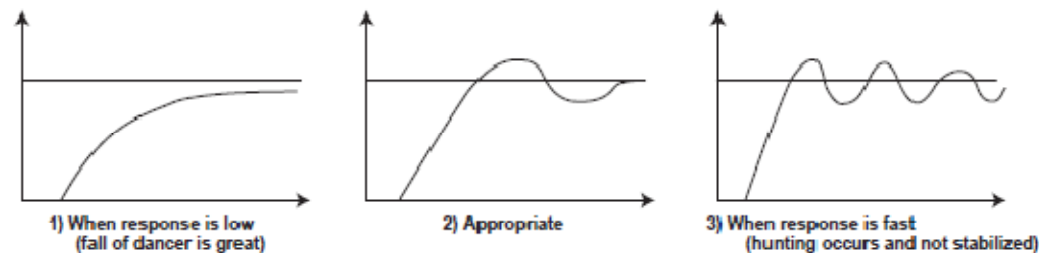
5. Alternative control methods

Depending on the type of application there are variations in the type of control principles that may be used. These are listed below:

Vector control - requires mounting of the FR-A7AP along with a motor with an encoder. This control method permits a faster response and higher accuracy of speed, torque and positioning.

PID control - allows the system to continually adjust the speed of the motor according to the tension placed on the dancer.

Diameter compensation –avoids increase of winding speed as the winding diameter increases/decreases



Hardware type

A700-A1- This is a variation of the A700 model however this model does not include a PLC. However the advantage is that a number of parameters have been enhanced for winding applications

Winding Applications

Mitsubishi Solution benefits

<i>Built-in PLC for independent inverter control</i>	<ul style="list-style-type: none"> • Improved application adaptability • Straightforward programming with GX-Developer • Reduced machine cost
<i>Precise speed and torque control for high accuracy winding</i>	<ul style="list-style-type: none"> • Ultra-precise speeds across the control range +/-0.01% • Accurate torque control +/-10% precision +/-5% repeatability
<i>Open networking:</i>	<ul style="list-style-type: none"> • Reduced wiring costs • Enhanced system integration • Improved data management
<i>Simplified parameter setup with Auto-tuning</i>	<ul style="list-style-type: none"> • Optimized parameter setup • Compensates for changes caused by temperature fluctuation
<i>Straightforward design:</i>	<ul style="list-style-type: none"> • Removable terminal block for simplified maintenance • Reduced maintenance times
<i>Self-diagnostics:</i>	<ul style="list-style-type: none"> • Monitoring of internal components prevents unnecessary downtime • System protection and overload functions
<i>Unmatched product reliability:</i>	<ul style="list-style-type: none"> • Long service life guaranteed • Key components designed for a life over 10 years
<i>Direct connection to HMI</i>	<ul style="list-style-type: none"> • Simplified machine operation for operator • Straightforward machine maintenance
<i>FR-Configurator software</i>	<ul style="list-style-type: none"> • Simple setup • System optimization

Winding Applications

Mitsubishi Solution benefits

- Reference Guide
- Application Guide
- Example Movie
- Program Files
- Basic Customer Presentation

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Application Reference Guide

Winding Applications

Mitsubishi Solution

Inverter: FR-A700
Sensor: 3rd party non-contact potentiometer
HMI: GOT1000 (Optional)
Motor: 3rd party motor

Application:

System configuration:

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Winding Applications

Questions

